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ABSTRACT

The study, involving 53 students from the National Technical Institute for the Deaf, investigated the relevance of certain aptitude-by-treatment interaction findings with normally hearing students to the instruction of hearing impaired students. Instructional variables investigated were classroom structure and student participation. Student aptitudes included were mainifest anxiety and perceived locus of control. The main effects of classroom structure and student participation were also considered. Outcome measures included students' rating of difficulty, teacher skill, teacher affect, and overall ratings. Learning performance was assessed with a completion-type examination of factual recall which was administered immediately after the rating of the instructional session. Among findings were the following: high participation resulted in higher ratings of teacher skill and overall ratings; high structure yielded higher overall ratings and examination performance; Ss sufficiently external in their perceived locus of control orientation and in low participation conditions gave higher ratings of teacher skill for high versus low structure. Ss low in internality perceived low structure conditions as more difficult than high structure conditions. Ss low in anxiety potential rated the high participation, low structure condition more favorable in terms of teacher affect, teacher skill, and overall; as opposed to Ss in the low participation, low structure condition. Findings were generally consistent with previous findings with normally hearing subjects and with the concept of trait-by-treatment task interactions. Appendixes contain sample data collection instruments, and tables and graphs illustrating statistical data. (SW)

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Classroom Structure and Student Participation: An Aptitude-by Treatment Interaction Approach to Instructional Research for the Hearing-Impaired

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#47

NTID's principal goal in doing research is to influence the education, training and career placement of deaf citizens through systematic examination of issues related to deafness. As one part of NTID's total research effort, the Department of Research and Development conducts descriptive and experimental research. Research findings are used in the development of programs and materials in the areas of learning and instruction, personal and social growth, and career development of deaf students. This document was developed in the course of an agreement with the U.S. Department of Education.

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Educational Implications

Previous studies conducted with normally-hearing students have revealed the criticalness of classroom structure and student participation in classroom situations. Overall, consistent findings are that both affective and learning performance outcomes are enhanced by high structure and/or high participation. However, more specific analyses and findings indicate that instructional outcomes due to structure or participation vary from student to student, with some learners doing better in low participation and/or structure classroom conditions. Two student aptitudes which have been shown to be critical in this way are perceived locus of control and manifest anxiety.

Locus of Control

Students with a relatively "internal" perceived locus of control tend to ascribe the consequences of their activities to their own behaviors and effort expenditure and hence assume responsibility for them. Such individuals have been shown to prefer and to learn more under instructional situations which provide low structure. Conversely, "internals" least prefer and learn less under highly structured situations. "Externals," on the other hand, tend to ascribe what happens to them as due to external, uncontrollable forces, such as other students, the teacher, luck, etc. Students with an external control orientation typically prefer and learn more under highly structured instructional situations.

The present study provides a replication of these effects for hearing-impaired learners, and affirms the criticalness of such considerations for NTID students. Findings unequivocally indicate that predictably different instructional outcomes occur due to such combinations of students' perceived locus of control orientation and structural/participatory features of classroom situations.

Manifest Anxiety

Manifest anxiety refers to a person's relatively stable tendency to react to a given situation with a debilitative emotional response. Previous instructional research has consistently demonstrated that students high in manifest anxiety learn best under low participation classroom situations. Similarly, students with a low potential for an anxiety response do best under a high participation situation. The findings from the present study provide a demonstration of this finding for hearing-impaired students in terms of their ratings of various aspects of the instructional situation.

One implication is that NTID and other hearing-impaired students vary in their reactions to the instructional situations investigated in ways quite similar to normally-hearing students. This suggests the applicability of the vast amount of previous instructional research with normally-hearing students at least for hypothesis generation.

A second implication of these findings is that students who are inadvertently mismatched in terms of their unique styles and a given instructional situation may have an unnecessarily difficult time. Counselors need to be sensitive to such possibilities and either work with individual students to facilitate their adaptation or to reassign them where multiple sections exist.

Lastly, the findings from the present and future studies which indicate the criticalness of student individual differences present a philosophical dilemma: Should individual differences be accommodated, thereby maximizing immediate instructional outcomes? The danger here is that such accommodation would extract the cost of making our students even less capable of dealing with situations which are incongruent with their uniquenesses. On the other

hand, the cost of adaptation is lowered immediate instructional outcomes and negative psychological and emotional reactions. The solution probably lies somewhere in the middle. That is, given the findings presented in this report, decision makers must address these issues, and determine which is best for the student in terms of the criticalness and immediacy of specific instructional outcomes.

Abstract

Previously conducted studies which have revealed aptitude-by-treatment interactions involving classroom structure, student participation, locus of control, and trait anxiety are reviewed. This research, which was performed with normally-hearing subjects, has yielded consistent, theoretically sound findings which conform to a person-environment fit model. The primary purpose of the present study was to examine the relevance of these previous findings to hearing-impaired persons. Subjects were instructed according to behavioral specifications for low versus high participation and structure in an experimental facsimile of a class session. Analyses revealed aptitude-by-treatment interactions involving structure, participation, locus of control, and trait anxiety. Findings were generally consistent with previous findings with normally-hearing subjects and with the concept of trait-by-treatment-by task interactions.

Classroom Structure and Student Participation: An Aptitude-by-Treatment Interaction Approach to Instructional Research for the Hearing-Impaired

Background and Purpose

Prior to 1960 research on classroom instruction for normally-hearing students focused on comparing different methods. Studies investigated both learning performance and attitudinal outcomes for various instructional techniques, including lecture, discussion, open classrooms, etc. The underlying assumption which gave rise to a plethora of such studies (Dubin and Taveggia, 1968 reviewed over 100) was that a single, optimal method of instruction for all students was possible. This vast body of research has failed to support this position. Most findings have indicated no difference between instructional methods, while an equal number of studies produced significant results supporting contradictory conclusions.

Subsequently, the philosophy and research domain either termed Aptitude-Treatment Interactions (Cronbach and Snow, 1977) or Trait-Treatment Interactions (Berliner and Cahen, 1973) became the focus of instructional research. This perspective is based on a person-environment fit model (Pervin, 1968) and takes into account learners' instructionally relevant individual differences (aptitudes or traits). Research over the past decade has produced many such studies which have yielded consistent, theoretically sound and pedagogically-important findings (see Cronbach & Snow, 1977).

Many studies have examined various aspects of classroom structure and/or student participation. As a result much is known regarding many critical

structural and participatory aspects and their interactions with certain aptitude variables. These include perceived locus of control (Rotter, 1966) and trait anxiety (Taylor, 1953). While there is every reason to expect that the findings uncovered are applicable to the hearing-impaired, empirical demonstration is lacking. The primary purpose of the present study was to investigate instructional outcomes for hearing-impaired students due to classroom structure and student participation in interaction with locus of control and trait anxiety.

Review of Studies

Locus of Control and Structure

Locus of control first emerged as a psychological construct within the context of social learning theory in the early 1960's. Since then, a vast number of empirical studies have been performed and numerous position papers and literature reviews have been written. As a result, a great deal is known about locus of control. The findings consistently indicate the criticalness of locus of control in interaction with classroom structure.

Rotter (1966) originally formulated the psychological construct and related theory which states that self-perceived locus of control is distributed such that two distinctly different types of persons may be identified. "Internals" are those who ascribe the consequences of their activities to their own behaviors and hence assume responsibility for them. Their perceived locus of control is, thus, internal in the sense that they believe there is a causal relationship between their own behaviors and associated consequences. It follows that internals believe that they can change (or control) their rewards and punishments by appropriately changing their own behaviors.

"Externals," on the other hand, ascribe the consequences of their behavior to forces outside of themselves, i.e., beyond their influence. Fate, luck, and powerful others are examples of such outside forces which represent external loci of control. Individuals holding this view of the world are not or less aware of or do not recognize the causal link between their behaviors and the consequences thereof.

Aptitude-by-treatment interactions (ATIs) between perceived locus of control and certain structural aspects of instructional situations have been demonstrated by several studies. Although definitions of structure employed vary somewhat from study to study, the findings are theoretically sound, consistent, and indicate that locus of control is a critical moderator variable with respect to various aspects of structure.

Arlin (1975) studied the interactive effect of task and class structure and locus of control on pupil attitudes. Thirty intact 4th, 6th, and 8th grade classes were employed. Structure was defined by principal's nominations of teachers as either excellent open teachers or excellent traditional teachers and supervisor ratings of teachers on an independently validated instrument (Arlin & Palm, 1974). Only teachers with consistent categorizations were included, and the rating scale assessed use of space, use of time, activities of children, content or topics, origin of activity, initiation of teacher-pupil interaction, teaching target, and pupil-pupil interaction. The IAR (Crandall, Katkovsky & Crandall, 1965) served as a measure of locus of control. Results indicated, on a student attitude questionnaire, that internals expressed more positive attitudes than externals to low-structure teaching environments.

When the instructional experience occurred within a highly structured environment there was no difference between internals and externals in terms of students' ratings. This suggests, within the context of this study, that imposed structure served a compensatory function for externals in terms of their expressed satisfaction.

Another quite similar study is reported by Rich and Bush (1978). College students were classified as internals or externals according to Rotter's I-E Scale (Rotter, 1966). Students evaluated high and low faculty-control instructional styles by completing a questionnaire following each class session. High control was defined in terms of lecturing, directing, or providing information, and low control in terms of student verbal or physical participation, either independently or student-to-student. As the authors hypothesized, students in instructional conditions theoretically congruent with their own locus of control orientation (i.e., external students/high control and internal students/low control) made more positive evaluations than students in situations judged incongruent with their own styles (external students/low control and internal students/high control).

Parent, Forward, Canter, and Mohling (1975) similarly examined interactions between locus of control and structure. These investigators, however, employed a measure of learning performance as well as satisfaction ratings as criteria. The Rotter I-E scale was employed to identify internals and externals, and structure was defined according to empirical dimensions extracted from subject descriptions of most and least disciplined classes on a pretest questionnaire. The high discipline condition imposed rules (strictness) related to not talking in class, not smoking, and not leaving the room without permission. Other characteristics included were structure, pressure, pace,

and formality. Conversely, the low discipline condition required self-pacing, was informal, and imposed no rules. Subjects were randomly assigned to either of these conditions and taught a two-hour mini-course on computer programming. Performance on an immediate posttest was as expected. Internals performed better and indicated greater satisfaction under the low structure condition, and externals demonstrated greater achievement and satisfaction under the high structure conditions.

Daniels & Stevens (1976) similarly examined learning performance as a function of structure and locus of control. Extreme scorers on the Rotter I-E scale were randomly assigned to traditional teacher controlled or to self-directed contract plan sections of an undergraduate psychology course. In the teacher controlled (structured) sections students were required to attend all lectures and complete assigned readings. Weekly quizzes and feedback, using a norm-referenced grading system, were employed. Students in the self-directed (unstructured) learning groups contracted for grades at the outset of the course. Requirements for various grade levels were stipulated and students chose areas of focus and specific projects. Lecture attendance and weekly quizzes were optional and if completed projects were unacceptable students were given feedback and allowed to make changes without penalty. All students were administered a 75-item multiple-choice achievement test immediately following the 8-week course in introductory psychology. Statistical analyses, which controlled for GPA and SAT math, revealed findings consistent with other studies. Learning performance was maximized for internals under the unstructured condition while externals achieved more following the traditional, structured method of instruction.

The preceding findings consistently indicate ATIs involving structure and locus of control. While Arlin (1975) and Rich & Bush (1978) employed student satisfaction as their criterion, Parent et al. (1975) and Daniels & Stevens (1976) extend that finding to include student achievement. Moreover, the consistency of findings is remarkable in view of already noted variations in structural features and student age levels employed. In all cases, high structure produced optimal student outcomes for externals, while low structure was most effective for relatively internal students. In addition, the length of instructional treatments employed and the use of intact classes further indicates the robustness of the effects and the representativeness of designs employed.

This review now focuses on a set of studies which similarly examined trait anxiety as an aptitude variable for investigations of teaching structure. As will be shown, student's anxiety potential is also a critical moderator variable which consistently interacts with structure.

Trait Anxiety and Structure

Trait anxiety refers to an individual's relatively stable, general predisposition to react with debilitative emotion to various situations (c.f. Spence, 1958). This trait is to be distinguished from "state anxiety" which refers to a person's actual, transient and usually situation-specific anxiety response (e.g., test anxiety). Several studies have yielded results which indicate the criticalness of trait anxiety to investigations of classroom structure. Once again, the findings are theoretically consistent and suggest a congruence model of instruction which stresses psychological consistency between certain critical individual differences and structural/participatory features of the classroom.

McKeachie (1951) found that achievement was directly related to structure. On a final exam a highly structured "recitation" group scored higher than a less structured "study-tutorial" group. A third "discussion" group scored between these two extremes. McKeachie concluded that a less structured situation is more anxiety provoking because of the ephemeral nature of student requirements.

Dowaliby & Schumer (1973) followed this lead and experimentally manipulated classroom structure. Two classes of introductory psychology students were administered the Taylor Manifest Anxiety Scale (Taylor, 1953) at the outset of the semester. The structured treatment, arbitrarily assigned to one of the classes, was termed and was in fact "teacher centered". The spotlight was on the teacher who lectured, directly answered all questions, and discouraged student-initiated responses. The converse was done for the unstructured, student-centered "discussion" class, which required active student participation. Significant differences in student participation were empirically verified for the period of instruction under investigation. The eight-week experimental period commenced following a three-week warm-up, and two multiple-choice course exams served as measures of factual knowledge. As expected, the results indicated that the highly structured, teacher-centered classroom produced higher exam performance for high anxious students. Similarly, the unstructured, student-centered condition was best for low-anxious students. There was no difference between the classes when anxiety was excluded from analyses.

Domino (1974) provides an independent replication of this effect. Other than the use of students in a literature rather than a psychology course,

pertinent characteristics were faithfully replicated. The trait anxiety scores related to examination performance as predicted: high anxious students performed best following a structured condition, while low anxious students demonstrated greater learning following the unstructured, student-centered condition.

These two studies provide a foundation for subsequent related work. However, the operational definitions employed for "structured" and "unstructured" treatments inadvertently combined participation with structure.

Peterson (1977 and 1979), noting this confounding, replicated and extended the finding by separating and factorially manipulating classroom structure and student participation. Both studies employed ongoing intact classes as treatment groups. The 1977 study employed ninth graders while the 1979 study used college students as subjects. These two studies were otherwise comparable in terms of independent variables. The factorial definitions of structure and participation yielded four treatment groups, which were differentially instructed according to the behavioral specifications shown in Table 1. The same analyses of essay and multiple choice exam performance were performed for both studies, with the findings compared and discussed in Peterson (1979). Results indicated ATIs more complex than those reported by previous investigators. Different lower-order interactions occurred with multiple choice and essay performance. Moreover, the ATIs for essay performance were different for each of the two studies. For example, the anxiety-by-structure effect was significant only for college students. The anxiety-by-participation effect, however, was significant in both studies. In short, other results which also incorporated an overall ability measure indicated

Table 1[a]

Behaviorial Specifications for Instructional Treatments used in the Present Study

Student participation	
High	Low
High structure	
1. Teacher elicits desired goals/objectives from students by asking questions.	1. Teacher tells desired goals/objectives.
[b]2. Teacher has student give review of previous day's lesson.	[b]2. Teacher gives review of previous day's lesson.
3. Teacher uses student ideas or responses to signal transitions.	3. Teacher signals for transitions.
[c]4. Teacher uses student ideas and adds mime and conceptual signs to emphasize important points.	[c]4. Teacher states important points with mime and conceptual signs for emphasis.
5. Teacher asks student(s) to summarize during the lesson.	5. Teacher summarizes during the lesson.
6. Teacher asks many questions and uses questions and student responses to structure lesson.	6. Teacher asks few questions, but uses those few questions and student responses to structure lesson.
7. Teacher tells students they will be required to participate in class and does call on students during class.	7. Teacher tells students they will not be required to participate in class and does not call on students during class.
8. Teacher waits several seconds after student remark to allow time for student comments.	8. Teacher does not wait after student remark but begins talking again.
[b]9. Teacher has students read aloud readings.	[b]9. Teacher reads aloud readings.
Low structure	
[b]1. No mention of goals/objectives.	[b]1. No mention of goals/objectives.
[b]2. No review of previous day's lesson.	[b]2. No review of previous day's lesson.
3. Few signals for transitions.	3. Few signals for transitions.
4. No mime or conceptual signs to emphasize important points.	4. No mime or conceptual signs to emphasize important points.
5. No summaries during lesson.	5. No summaries during lesson.
6. Teacher asks many questions to elicit facts, concepts, principles, and opinions but does not attempt to use them to tie the lesson together.	6. Teacher asks few questions and does not use those few questions to tie the lesson together.
7. Teacher does not explicitly tell students they will be required to participate in class, but does call on them during class.	7. Teacher does not mention student participation and does not call on students during class.
8. Teacher waits several seconds after student remark to allow time for student comments.	8. Teacher does not wait after student remark but begins talking again.
[b]9. Teacher has students read aloud readings.	[b]9. Teacher reads aloud readings.

[a]Modified from Peterson (1977), page 782, Table 1.
[b]Not used in the present study.
[c]Peterson (1977) employed verbal markers here.

the following ATIs: anxiety-by-structure, anxiety-by-participation, ability-by-anxiety-by-structure, ability-by-anxiety-by-participation, and finally, ability-by-anxiety-by-structure-by-participation.

These studies have consistently indicated the presence of ATIs involving students' trait anxiety with structural and participatory aspects of the instructional situation. The simple ATI uncovered by Dowaliby & Schumer (1973) and replicated by Domino (1974) clearly supports a congruence model of instruction: students demonstrated greater learning performance when the structural/participatory aspects investigated were congruent with their anxiety potential. Peterson (1977 & 1979) examined a larger set of independent variables which were shown to be consistent with prior findings but interrelated in more complex ways.

This increase in complexity is also consistent with Snow's (1977) suggestion that general instructional theory may not be possible and that we should concentrate on the development of specific instructional theories concerned "with narrowly circumscribed local instructional situations, relatively small chunks of curriculum for relatively small segments of the educational population. Such theories would be expected to generalize more across time in one place than across places" (p. 12). Much of the added complexity indicated by Peterson's (1977 & 1979) findings is due to variations in populations examined (ninth grader's versus college students) and tasks performed (essay versus multiple choice). Thus, findings uncovered by the present study should be more replicable at NTID than, for example, at Gallaudet College. NTID is a technical college which stresses non-people oriented majors during recruitment activities whereas Gallaudet is a liberal arts college. However, the

expectation is that findings should be somewhat generalizable to all populations of postsecondary hearing-impaired students.

Summary and Purpose

Studies have been reviewed which uncovered theoretically consistent ATIs with classroom structure and student participation. Aptitudes which interact with structure and participation have been shown to be perceived locus of control and trait anxiety. Criteria employed include student satisfaction, factual knowledge, and higher-order cognition (as required for essay tests). The findings are generally consistent with the congruence model of instruction expressed by Pervin (1968) and others. The primary purpose of the present study was to examine the generalizability of these findings to the hearing-impaired.

Method

Subjects

Fifty-five NTID students served as paid volunteers. Photography majors and students with a knowledge of photography were not allowed to participate since the instructional content was about photography. These students had been at NTID for from 1 to 5 years, with an average of 1.62 years. Their average grade-equivalent reading ability was 9.79, and ranged from 7.8 to 12. The average pure tone hearing loss for these students was 105.4 dB and ranged from 57 dB to 120 dB.

Instructional Treatments

The behavioral specifications from Peterson (1977) for low versus high structure and low versus high student participation were employed in designing

and implementing four facsimiles of a class session. Certain modifications were made to Peterson's (1977) instructional specifications due to the use of hearing-impaired subjects and a one-session instructional situation. Table 1 on page 9 presents the specifications employed by the present study. The instructional period ran for approximately 30 minutes and was video taped for future analysis. An experienced instructor, who was also a teacher training specialist for the hearing impaired, was trained in each of the instructional techniques and served as the teacher.

Aptitudes

The Children's Manifest Anxiety Scale (CMAS; Castaneda, McCandless, & Palermo, 1956) and the Learning Style Inventory (LSI; Dowaliby, Burke, & McKee, 1981) were administered to individual subjects. The CMAS yields a measure of an individual's anxiety potential and was chosen for its appropriate reading level. The LSI was especially designed for hearing-impaired students at NTID and yields 2 measures of locus of control: 1) Externality; and 2) Internality. Externality refers to a person's tendency to attribute behavioral consequences to external, uncontrollable, powerful others. These sources of perceived external control include teachers, luck, other students, other people, and task difficulty. Internality reflects a person's tendency to attribute the consequences of their activities to the internal, controllable factor of their own expenditure of effort. These are discrete factors of the locus of control construct with a correlation coefficient of -.16. More information on the derivation of the scales and their composition is available in Dowaliby, Burke, and McKee (1981).

Instructional Material and Criterion Tests

The content was taken from a captioned, commercially-available film about the basic principles of photography. The caption script was transformed into standard connected prose. The teacher taught this material using the appropriate instructional specifications. A 19-item fill-in-the-blank test assessed factual knowledge. Key sentences from the instructional prose in incomplete form and in random sequence comprised the "Test of Photography Knowledge." Each item was scored 0-3 depending upon the answer's approximation to a complete, correct response. Scores could therefor range from 0 to 57. Additionally, certain student attitudes and perceptions were assessed with the "Class Attitude Survey." This was a 23-item, Likert-response questionnaire adapted especially for this study from the Instructional Rating Survey (McKee & Dowaliby, 1980). The attitude survey yielded the following measures: 1) Perceived Difficulty (3 items); 2) Teacher affect (6 items); 3) Teacher Skill (6 items); 4) Overall Rating (3 items); 5) Perceived Student Participation (4 items); and 6) Perceived Structure (1 item). The first 4 were student outcomes of interest and served as dependent measures in addition to the scores from the test of photography knowledge. The measures of perceived participation and structure were employed as one technique for verifying proper treatment implementation. Copies of these instruments are provided in Appendix A.

Design and Procedure

Each subject was administered the aptitude tests and randomly assigned to one of the four instructional conditions when they signed up to participate in the study. This resulted in from 12 to 16 subjects assigned to each of

the four participation-by-structure cells. Approximately 1 week following this procedure subjects in each cell were instructed as an intact group according to the appropriate specifications and then administered the criterion tests. The attitude survey was administered prior to the knowledge test so as to obtain a less contaminated measure of subjects' perceptions. These procedures required approximately 2 hours of subjects' time.

Analyses and Results

Between-subject participation-by-structure analyses of variance were performed on available background and aptitude variables to investigate the pre-treatment comparability of groups. The videotapes of the instructional situations were also analyzed in order to verify the fidelity of treatment implementation. Instructional outcomes due to participation, structure, and interactions thereof were assessed by between-subject analyses of variance while ATIs were analyzed by simple and multiple correlational techniques.

Background and Aptitude Variables

Possible pre-treatment differences between the groups of subjects were assessed. The results of those analyses of variance are shown in Table C2, and Table C3 presents means and standard deviations (Appendix C). The only pre-treatment difference was in terms of simultaneous communication ability, for the two levels of participation. It is not evident how this difference could effect other results since subjects' communication participation was controlled and verified and most of the findings are in terms of structure rather than participation. Moreover, as will be reported, multiple regression analyses indicated that simultaneous communication scores were unrelated to criterion measures.

Treatment Implementation

The fidelity of treatment implementation was also of preliminary concern. The split-screen videotapes of the instructional sessions were analyzed with regard to critical behaviors. The results are shown in Table C1, Appendix C, and indicate unequivocal conformance to treatment specifications. It was also verified at this time that the criterion-relevant content was covered by the teacher in each instructional condition. In addition, subjects' perceptions (ratings) of structure and participation during instruction were analyzed using separate parcicipation-by-structure analyses of variance. The results are summarized in Table C2, Appendix C, and show that subjects' perceptions were congruent with conditions (both p's$<$ .01). Table C3, Appendix C, presents the means and standard deviations relevant to this effect.

Main Effects

The analyses of variance of the criterion measures are summarized by Table 2. As shown, high participation yielded significantly higher teacher skill ($p<.01$) and overall ($p<.05$) ratings. Similarly, high structure resulted in significantly higher overall ratings ($p<.05$) and test performance ($p.<01$). Table 3 displays the means and standard deviations for criterion measures for each of the instructional conditions. Significant differences were also found in terms of instruction time (which varied due to treatment specifications) and test time. The high levels of participation and structure both required more instruction time than their low level counterparts. The mean for high participation conditions combined was 46.8 minutes as compared with the mean time for the low participation conditions of 30.2 minutes. Similarly, the combined high structure conditions required an average of 41.9 minutes

Table 2

Summary of Participation-by-Structure
Analyses of Variance on Criterion Tests

Dependent Variable	Instructional Variable: Participation (P) df	F	Structure (S) df	F	PXS df	F
Student Ratings						
Perceived Difficulty	1,46	.3	1,46	1.0	1,46	.2
Teacher Affect	1,46	2.3	1.46	1.3	1,46	.001
Teacher Skill	1,46	9.66**	1,46	1.7	1,46	1.7
Overall	1,51	5.6*	1,51	4.5*	1,51	.4
Test Score	1,51	2.2	1,51	16.2**	1,51	.03

*p< .05
**p< .01

Table 3

Means, Standard Deviations and N's for Criterion Measures for Each Instructional Condition

	Instructional Condition											
	High Structure						Low Structure					
	High Participation			Low Participation			High Participation			Low Participation		
Variable	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Perceived Difficulty	2.95	.54	13	2.76	.56	14	3.00	.53	12	3.02	.61	16
Teacher Affect	3.76	.47	13	3.48	.66	14	3.60	.31	12	3.34	.54	16
Teacher Skill	4.15	.56	13	3.68	.71	14	4.08	.60	12	3.31	.67	16
Overall Rating	3.82	.59	13	3.50	.61	14	3.56	.67	12	3.00	.80	16
Test Score	25.00	10.02	13	20.50	11.48	14	13.50	11.35	12	9.94	7.70	16

versus 34.7 minutes for low structure conditions. These differences are not considered critical in view of the focus on aptitude-by-treatment interactions (ATIs) rather than solely on treatment main effects.

Aptitude-by-Treatment Interactions

Possible interactions between the instructional conditions and each aptitude were investigated using simple, linear regression techniques. In this type of data analysis a criterion measure is regressed on to an aptitude measure separately for each condition under investigation. A test of parallelism of regression slopes is then performed between conditions. An ATI is indicated by the observance of two or more conditions with significantly ($p < .05$) non-parallel regression slopes. Conceptually, such non-parallelity indicates the presence of different aptitude-criterion relationships due to experimental conditions. Two or more such interacting regression lines often cross over within the observed range of the aptitude variable. This indicates that the two conditions yielded optimal criterion performance for subjects at different ends of the aptitude continuum.

However, at the crossover point of the two regression lines both conditions are equal in terms of the predicted criterion score. In addition, this "point of non-significance" extends to form a "region of nonsignificance". The range of this region about the crossover point depends on the magnitude of the aptitude-criterion relationships, the disparity in the regression slopes, and the error rate employed in determining the region. This region of non-significance is calculated using the Johnson-Neyman Technique (Johnson and Neyman, 1936). More information on the technique, which is analogous to contrasts following significant analysis of variance effects, is available from Berliner and Cahen (1973) and Cronbach and Snow (1977).

In the present study, each of the criterion measures was separately regressed on to each of the aptitude measures for each condition of instruction. Tests of parallelism of the four regression slopes (one per condition) were then performed. When significantly different slopes were revealed (i.e., $p < .05$) the Johnson-Neyman Technique was employed with alpha = .05.

Locus of Control. Separate analyses were performed with each of the dimensions, externality and internality, as the aptitude variable. The analysis of teacher skill ratings regressed onto the externality scores yielded an ATI between the low participation, low structure and the low participation, high structure conditions. The slopes for these conditions were significantly non-parallel ($F(1,26) = 5.63$, $p < .03$). The Johnson-Neyman Technique revealed that these conditions were significantly different above 2.6 on the externality dimension ($p = .05$). Over 36% of the subjects in these conditions fell into this region of significance. This result is displayed by Figure 1 and indicates that the low participation, high structure condition resulted in significantly higher ratings of teacher skill for subjects above 2.6 on externality. However, these conditions are shown to not differ significantly (i.e., $p < .05$) for subjects below this point. This result is consistent with reviewed findings which indicate that relatively external students rate highly-structured instructional conditions more favorably than students who are less external in their control orientation.

The same analyses were performed with internality as the aptitude measure. In addition, low versus high structure (with participation levels collapsed) and low versus high participation conditions (with structure levels collapsed) were similarly analyzed. The significant effects are summarized in Table 4,

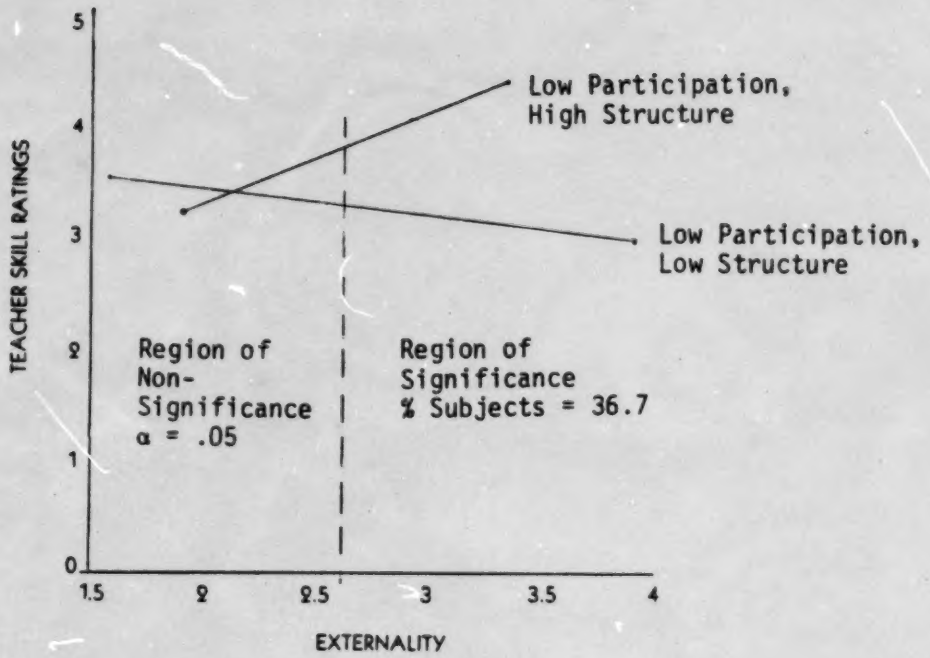

Figure 1. Regression of teacher skill ratings on to externality for the low participation, high structure versus the low participation, low structure conditions.

Table 4

Summary of ATI Analyses With
Internality as the Aptitude Variable

Significantly Different Conditions[a]	Dependent Variable	Test of Parallel Slopes F	df	p	Internality Scores for Region of NS		% Subjects Outside Region of NS % Below	% Above
LPLS, HPHS	Difficulty	3.91	1,25	.05	region infinite		0.0	0.0
LPLS, LPHS	Difficulty	7.43	1,26	.01	3.74,	5.07	43.3	0.0
LS, HS	Difficulty	4.67	1,51	.04	3.64,	8.92	38.2	0.0
HPLS, HPHS	Affect	12.57	1,21	.01	3.47,	4.41	36.0	16.0
LS, HS	Affect	5.34	1,51	.03	3.39,	5.61	27.3	0.0
HPLS, LPHS	Overall	4.37	1,22	.05	-1.3,	5.13	0.0	0.0
HP, LP	Overall	5.95	1,51	.02	.63,	3.63	0.0	61.8
LPLS, LPHS	Knowledge Test	5.78	1,26	.03	3.89,	6.91	56.7	0.0
HPHS, LPHS	Knowledge Test	4.93	1,23	.04	-.74,	3.87	0.0	25.9

[a]LPLS = low participation, low structure
LPHS = low participation, high structure
HPLS = high participation, low structure
HPHS = high participation, high structure
LS = low structure, participation levels collapsed
HS = high structure, participation levels collapsed
LP = low participation, structure levels collapsed
HP = high participation, structure levels collapsed

and include the dependent variables of perceived difficulty ratings, teacher affect ratings, overall ratings, and performance on the knowledge test. For the sake of parsimony, only those ATIs which were judged most informative or critical are displayed in the following text. However, Appendix D provides figures of all significant ($p < .05$) ATIs uncovered by the present study.

The ATI involving classroom structure and internality, in terms of perceived difficulty, is displayed by Figure 2. As shown, the low structure conditions resulted in significantly higher ratings of perceived difficulty as compared with the high structure conditions for subjects below 3.64 on the internality dimension ($p = .05$). Differences above this point are indicated as being non- significant ($p < .05$). In the present study, 38.2% of the subjects are in this region of significance. This result is consistent with previous findings which revealed that individuals who tend to not assume responsibility for their own actions prefer highly structured conditions. This suggests that low internal individuals tend to defer responsibility in the presence of salient structural features. Such persons evidently perceive high difficulty in the absence of such structural cues. This finding suggests that over 38% of postsecondary hearing-impaired students may be expected to perceive low-structured classroom instructional situations as difficult.

Also shown in Table 4, the analysis of teacher affect ratings revealed an ATI involving the high participation, low structure and the high participation, high structure conditions. Figure 3 displays this result. This time significant and opposite treatment effects were revealed for low and high internal subjects ($p = .05$).[1] As shown, teacher affect ratings were maximized by the high participation, high structure condition for subjects below 3.47 on the internality dimension. This condition, however, resulted

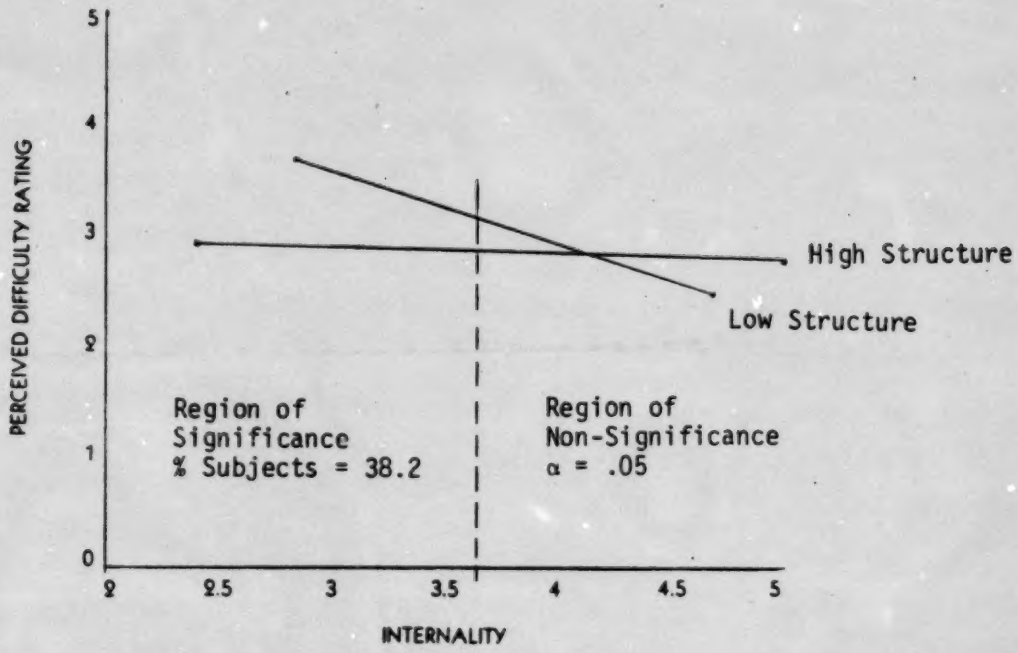

Figure 2. Regression of perceived difficulty ratings on
to internality for high versus low structure instructional conditions.

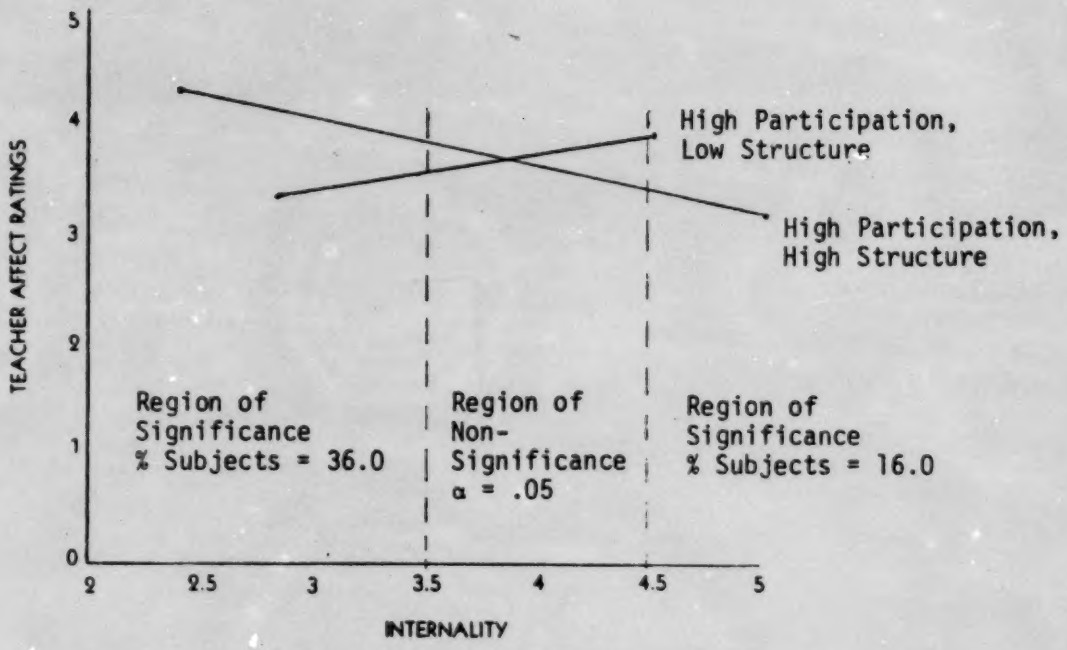

Figure 3. Regression of teacher affect ratings on to internality for the high participation, low structure and the high participation, high structure conditions.

in significantly lower affect ratings than did the high participation, low structure condition for subjects above 4.41 on the internality dimension ($p = .05$). There were 36% of the subjects below the region of non-significance and 16% above. Thus, in terms of teacher affect ratings, this ATI accounts for a total of 52% of the subjects in these two instructional conditions. This result is also consistent with previous findings.

The overall ratings were similarly analyzed. An ordinal interaction, with significant differences as a function of participation levels, was revealed. Figure 4 displays this result and indicates that the high participation conditions resulted in significantly higher overall ratings as compared with the low participation conditions for subjects above 3.63 on the internality dimension. This region of significance included over 61% of the subjects in the present study. This result is consistent with previous findings and makes sense. Individuals high in internality (i.e., who attribute behavioral consequences to their own effort expenditure) rate more highly instructional situations in which they actively participate (i.e., have an opportunity to expend effort). This finding suggests that active participation during classroom instruction is favored by over 61% of all NTID students. However, it is important to note that the amount of participation is irrelevant to overall ratings for approximately 39% of NTID students.

Lastly, performance on the knowledge test was similarly analyzed. The result for the low participation, high structure versus the high participation,

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[1]This is termed a disordinal ATI, as compared with an ordinal ATI where a significant between-treatment effect occurs at only one end of the aptitude continuum.

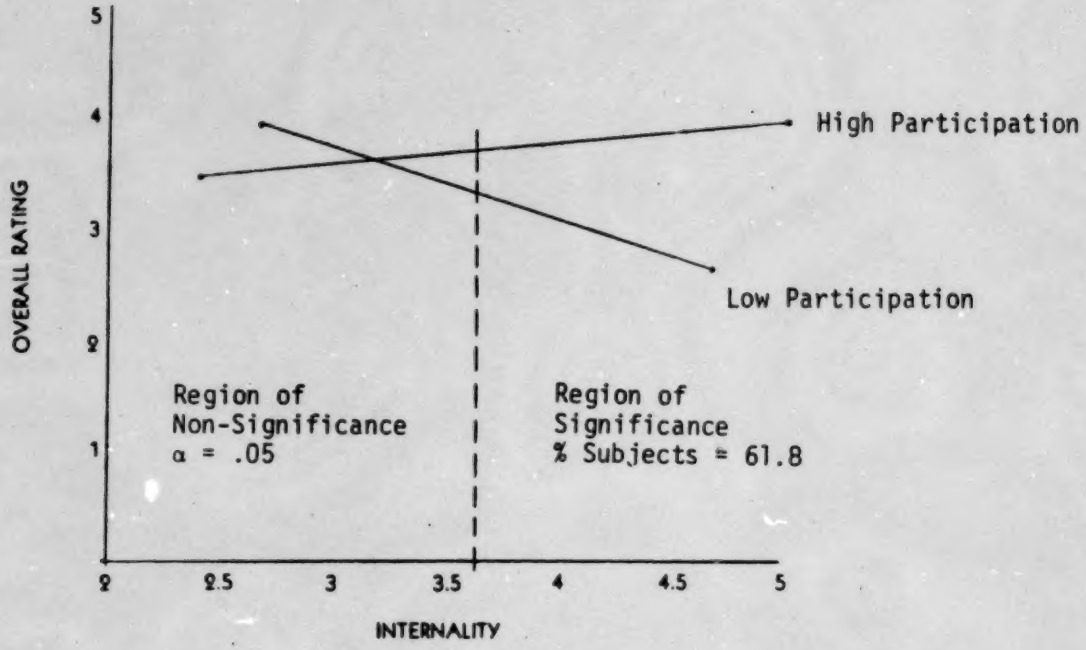

Figure 4. Regression of overall ratings on to internality for high versus low participation instructional conditions.

high structure conditions is displayed by Figure 5. As shown, subjects above 3.87 on the internality dimension performed significantly higher as a result of the high participation, high structure condition as compared with the low participation, high structure condition. Note that both of the low structure conditions scored significantly lower. This is shown by Figure D4, Appendix D and is represented by the significant structure main effect. Thus, this result indicates that performance on the knowledge test varied significantly as a function of participation levels and internality given high structure. Approximately 26% of the subjects in these conditions fell into the region of significance. However, it is critical to note the trend, although not significant, in the opposite direction for subjects below the point of non-significance. More specifically, the predicted scores on the knowledge test for subjects below 3.26 on the internality dimension are optimized by the low participation, high structure condition. This finding indicates the importance of structure and participation as a function of internality. This result is consistent with other reported findings of the present study as well as previous findings, and indicates the necessary qualifications for interpreting the previously reported main effects due to structure per se.

Manifest Anxiety. Possible ATIs with manifest anxiety were similarly analyzed. Significant ($p < .05$) results are summarized in Table 5 and displayed by Figures D5-D7, Appendix D. As shown, these ATIs were in terms of ratings of teacher affect, teacher skill, and overall ratings. An examination of the anxiety-criterion correlations by conditions in Tables B2-B4, Appendix B indicates that the low structure, low participation and the low structure,

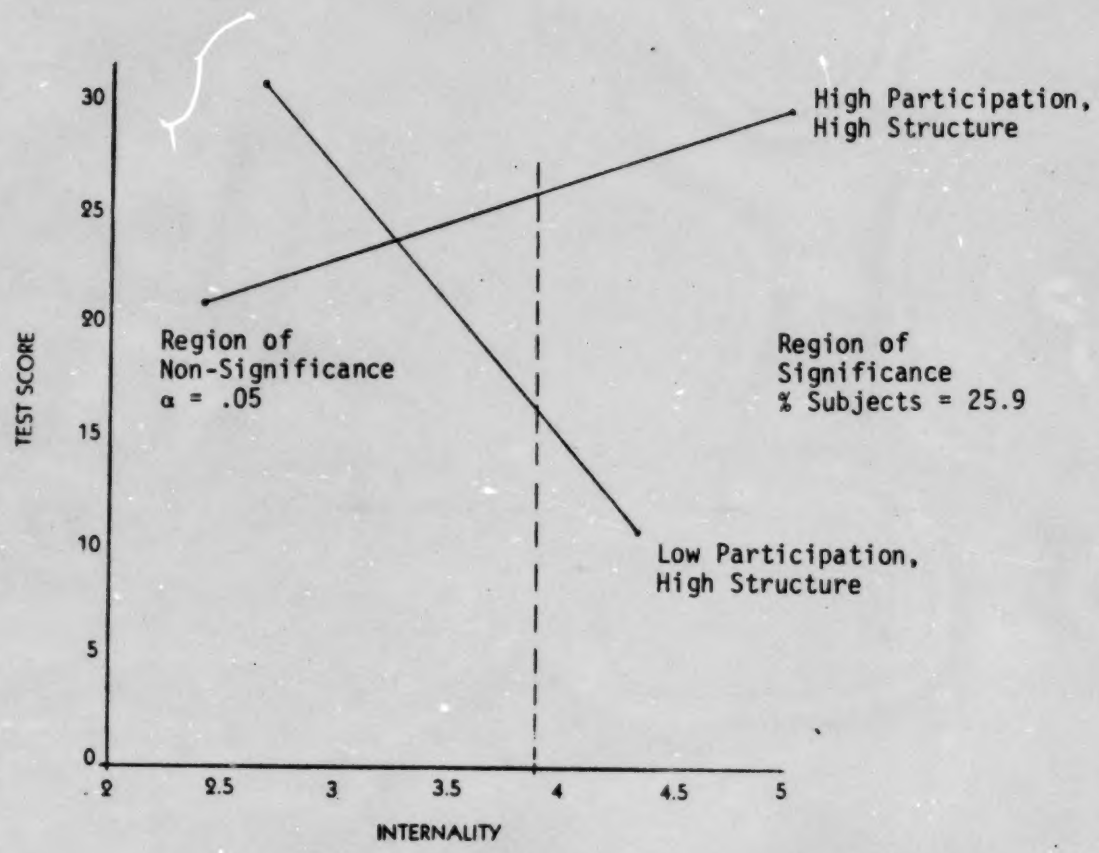

Figure 5. Regression of test score on to internality for the high participation, high structure versus the low participation, high structure conditions.

Table 5

Summary of ATI Analyses With Manifest Ability as the Aptitude Variable

Significantly Different Conditions[a]	Dependent Variable	Test of Parallel Slopes F	df	p	Anxiety Scores for Region of NS		% Subjects Outside Region of NS % Below	% Above
LPLS, HPLS	Affect	18.66	1,24	.01	15.39,	22.94	53.6	14.3
LPLS, HPHS	Affect	7.03	1,25	.02	16.84,	41.20	44.8	0.0
LPLS, LPHS	Affect	5.36	1,26	.03	10.38,	41.96	26.7	0.0
LPLS, HPLS	Skill	6.15	1,24	.02	18.63,	67.29	71.4	0.0
LPLS, HPHS	Skill	4.65	1,25	.04	20.18,	205.96	79.3	0.0
LPLS, LPHS	Skill	5.88	1,26	.03	13.46,	46.51	46.7	0.0
LPLS, HPLS	Overall	16.85	1,24	.01	16.20,	24.97	53.6	10.7
LPLS, HPHS	Overall	12.35	1,25	.01	18.67,	32.44	65.5	0.0
LPLS, LPHS	Overall	12.75	1,26	.01	15.16,	27.11	60.0	6.7

[a]LPLS = low participation, low structure
LPHS = low participation, high structure
HPLS = high participation, low structure
HPHS = high participation, high structure

high participation conditions produced the strongest and most disparate relationships. These ATIs are shown in Figures 6-8. As is shown, the ATIs for the teacher affect and for overall ratings are disordinal, while the interaction for the teacher skill ratings is ordinal. These disordinal ATIs indicate that, with low structure, these criteria varied as a function of manifest anxiety and levels of participation. Outcomes were maximized by the low participation, low structure condition for high anxious subjects, while the high participation, low structure condition maximized these outcomes for low anxious subjects. These results make sense and conform to discussions of manifest anxiety in terms of drive and emotional reactivity (Spence, 1958). The findings from the present study suggest that low anxious subjects' drive is facilitated by the high level of participation; high anxious subjects, however, evidently have a debilitative emotional reaction to the high level of participation in the presence of low structure. The high level of structure evidently serves a compensatory function in these regards as is indicated by the homogeneity of anxiety-criterion relationships for the high structure, low participation versus the high structure, high participation conditions (see Tables B2-B4, Appendix B).

Multiple regression analyses were also performed for each of the criterion measures. Contrast coding (Cohen & Cohen, 1975) was employed for instructional treatments, and standard scores were employed for aptitude scores. ATI terms were formed by multiplying treatment codes by aptitude standard scores (see Cronbach & Snow, 1977). A stratified, stepwise procedure was used so as to control the order of sets of factors and so that only significant factors would be included. The error rate of $p = .05$ was employed as the criterion for factors entering the equation

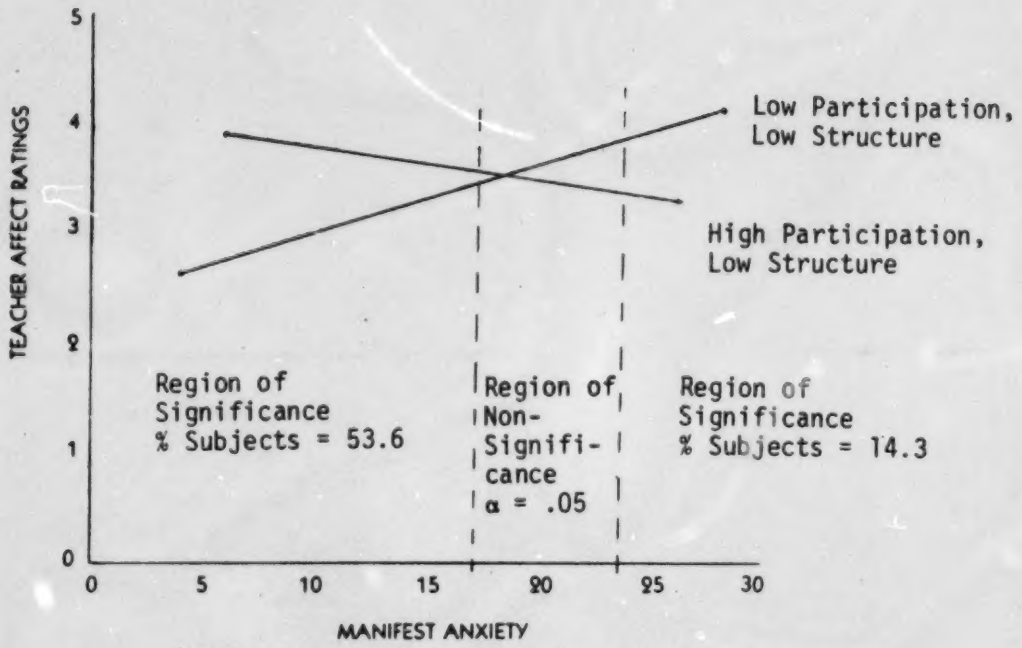

Figure 6. Regression of teacher affect ratings on to manifest anxiety for the low participation, low structure versus the high participation, low structure conditions.

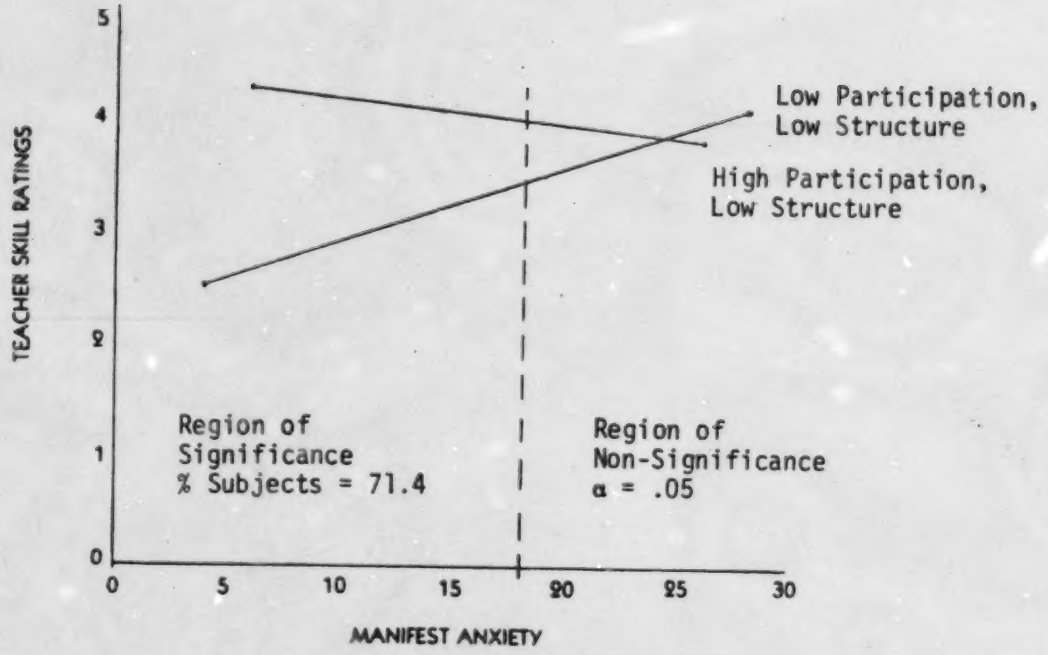

Figure 7. Regression of teacher skill ratings on to manifest anxiety for the low participation, low structure versus the high participation, low structure conditions.

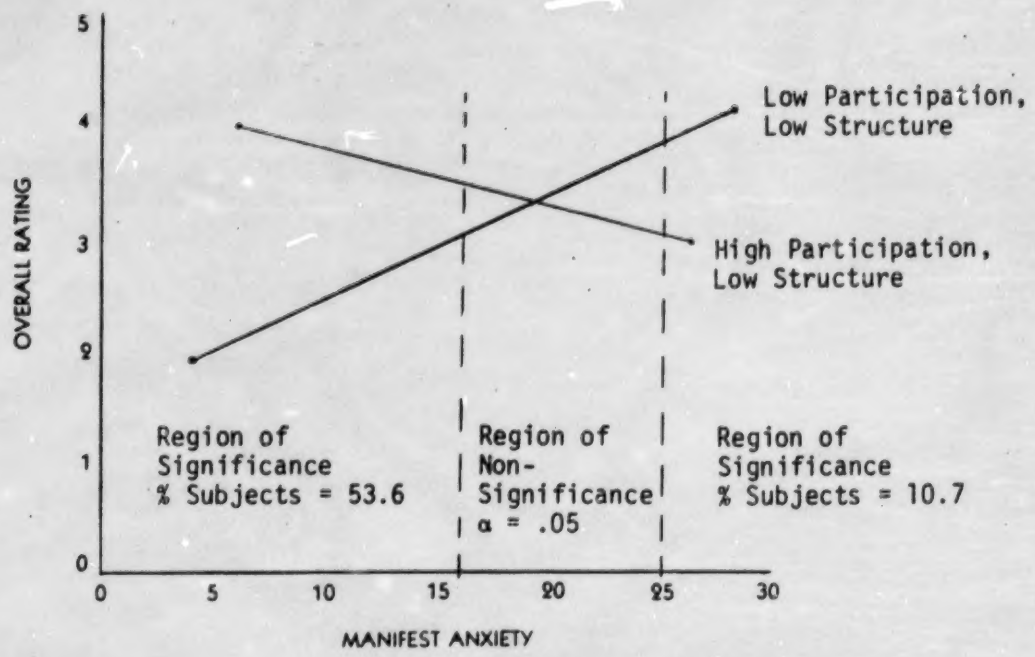

Figure 8. Regression of overall ratings on to manifest anxiety for the low participation, low structure versus the high participation, low structure conditions.

within this stratification scheme. The background variables of reading ability, simultaneous communication ability, sex, and year in college were allowed to enter first. Aptitude and treatment variables comprised the next strata, then first-order ATI terms, and finally second-order ATI terms. The background variables were employed solely as possible covariables and were allowed to enter first for that reason. Aptitude and treatment variables were next so as to remove effects due to these lower-order factors before first-order ATI terms were considered. Similarly, second-order ATI terms were allowed to enter last so as to control for any influence due to the lower-order ATIs. The results are summarized in Tables 6-10 and indicate the relative contribution of each factor in accounting for variation in each of the criterion variables.

As is shown in Table 6, the main effects of externality and manifest anxiety were the only factors which significantly related to the perceived difficulty ratings ($p < .05$). The positive sign for each of these relationships indicates that subjects high in externality and high in manifest anxiety rated the instructional situations as more difficult than did subjects who measured low in these aptitudes. This result is consistent with Spence's emotional reactivity hypothesis regarding manifest anxiety (Spence, 1958) and with theoretical discussions of locus of control (e.g., Rotter, 1966) as well as a host of empirical findings. It was expected that some ATI factors would also be significantly related to this outcome. Evidently, however, the main effects of externality and manifest anxiety accounted for the variation in the difficulty ratings analyzed and reported as univariate ATI effects (see Table 4).

Table 6

Summary of Significant Multiple Regression Factors Accounting for Variance in Perceived Difficulty Ratings (N=51)

Variable[b]	R	R-Squared	Increase in R-Squared	Beta	F
Externality	.321	.103	.103	.318	5.86*
Manifest Anxiety	.416	.173[a]	.070	.264	4.05*

*$p < .05$

[a]R-squared adjusted for inflation = .138.

[b]Variables are listed in order of entry.

The results from the multiple regression of the teacher affect ratings are summarized in Table 7. As indicated, three of the first-order ATI factors and the main effect of student participation entered the equation (all p's $< .05$) and accounted for over 28% of the variance in teacher affect ratings. The internality X structure ATI term entered first ($p < .01$) and accounted for over 10% of the variance in the affect ratings. The sign of the relationship indicates that subjects high in internality in low structure conditions gave higher ratings of teacher affect than did high internal subjects in highly structured conditions. High internal individuals tend to attribute outcomes of their activities to their own efforts and prefer situations which are low in structure and thus allow them to expend effort. These results also indicate that the high structure conditions maximized the teacher affect ratings for subjects low in internality, who tend to not make such attributions of the outcomes of their activities. This ATI makes sense and is consistent with previously cited findings. Student participation accounted for over 9% of the affect ratings ($p < .01$) with high participation conditions yielding higher ratings than low participation conditions. This result is surprising in view of the non-significant univariate ANOVA (see Table 2). However, the participation factor only stepped in following the internality X structure ATI term, and is consistent with teachers' anecdotes. Hearing-impaired students generally are accustomed and prefer to participate in classroom situations. The anxiety X structure and anxiety X participation terms entered next (p's $< .05$). Each accounted for the same portion of variance

Table 7

Summary of Significant Multiple Regression Factors Accounting for Variance in Teacher Affect Ratings (N=51)

Variable[b]	R	R-Squared	Increase in R-Squared	Beta	F
Internality X Structure	.321	.103	.103	-.432	12.15**
Student Participation	.442	.195	.092	.337	7.30**
Anxiety X Structure	.517	.267	.072	-.289	5.47**
Anxiety X Participation	.582	.339[a]	.072	-.269	4.98*

*p< .05
**p< .01

[a]R-squared adjusted for inflation = .281.

[b]Variables are listed in order of entry.

in the teacher affect ratings (7.2%) and in each case the same relationships are indicated. High anxiety subjects' ratings were maximized by low levels of participation or structure, and low anxiety subjects' ratings were maximized by high levels of participation or structure.

The results of the analyses of the teacher skill ratings are summarized in Table 8. As shown and consistent with the teacher affect ratings, high student participation yielded higher ratings of teacher skill than did low participation conditions ($p < .01$). This factor accounted for over 20% of the variance in teacher skill ratings. The internality X structure ATI ($p < .01$) accounted for an additional 9.6%, and the anxiety X structure term ($p < .05$) over 7% of the variance in these ratings. Collectively, over 33% of the variance in teacher skill ratings was accounted for by these three factors.

The overall ratings were similarly analyzed and are summarized in Table 9. As is shown, student participation entered first ($p < .01$) and accounted for 8.7% of the variance. The three first-order ATIs: Internality X participation ($p < .06$); anxiety X structure ($p < .05$); and anxiety X participation ($p < .05$) then entered. Lastly, the second-order ATI of anxiety X structure X participation entered ($p < .05$). Together, these factors accounted for 37.5% of the variance in overall ratings. The ATIs collectively accounted for over 30% of the variance in overall ratings.

Lastly, Table 10 summarizes the results of the knowledge test. As is indicated, reading ability and classroom structure accounted for 36% and 22%, respectively, of the test score variance. Together, these

Table 8

Summary of Significant Multiple Regression Factors Accounting for Variance in Teacher Skill Ratings (N=51)

Variable[b]	R	R-Squared	Increase in R-Squared	Beta	F
Student Participation	.454	.206	.206	.565	22.28**
Internality X Structure	.550	.302	.096	-.363	9.27**
Anxiety X Structure	.611	.373[a]	.071	-.274	5.32*

*p< .05

**p< .01

[a]R-squared adjusted for inflation = .333.

[b]Variables are listed in order of entry.

Table 9

Summary of Significant Multiple Regression
Factors Accounting for Variance in Overall Ratings

Variable[c]	R	R-Squared	Increase in R-Squared	Beta	F
Student Participation	.296	.087	.087	.335	8.69**
Internality X Participation	.452	.204	.117	.229	3.92[a]
Anxiety X Structure	.542	.294	.090	-.295	6.74*
Anxiety X Participation	.594	.352	.058	-.250	4.87*
Anxiety X Structure X Participation	.661	.437[b]	.085	.301	6.79*

*$p < .05$

**$p < .01$

[a] $p < .06$ (at time of entry this p was $< .05$).

[b] R-squared adjusted for inflation = .375.

[c] Variables are listed in order of entry.

factors accounted for over 56% of this variance, with both variables positively relating to test performance.

Discussion, Conclusions, and Implications

The primary purpose of the present study was to investigate the relevance of certain aptitude-by-treatment interaction findings from normally-hearing students to hearing-impaired students. Instructional variables investigated were classroom structure and student participation. Student aptitudes included were manifest anxiety and perceived locus of control. In the process of this investigation, the main effects of classroom structure and student participation were also investigated. Outcome measures included students' ratings of difficulty, teacher skill, teacher affect, and overall. Learning performance was assessed with a completion-type examination of factual recall which was administered immediately following the rating of the instructional session.

Analyses revealed the following findings:

- o High participation resulted in higher ratings of teacher skill and overall ratings.
- o High structure yielded higher overall ratings and examination performance.
- o Subjects sufficiently external in their perceived locus of control orientation and in low participation conditions gave higher ratings of teacher skill for high versus low structure.
- o Subjects low in internality perceived low structure conditions as more difficult than high structure conditions.

Table 10

Summary of Significant Multiple Regression Factors Accounting for Variance in the Knowledge Test (N=51)

Variable[b]	R	R-Squared	Increase in R-Squared	Beta	F
Reading Ability	.600	.360	.360	.567	36.73**
Classroom Structure	.762	.581[a]	.223	.473	25.53**

**$p < .01$

[a]R-squared adjusted for inflation = .563.

[b]Variables are listed in order of entry.

- Low internal subjects in high participation conditions gave higher ratings of teacher affect as a result of high versus low structure. Conversely, high internal subjects in high participation conditions gave higher ratings of teacher affect as a result of low versus high structure.
- Overall ratings for high internal subjects were maximized by high versus low participation.
- Test performance for internal subjects in high structure conditions was maximized by high versus low participation. A trend (although not significant) in favor of low participation for low internal subjects was also revealed.
- Subjects high in anxiety potential rated the low participation, low structure condition more favorably in terms of teach affect and overall, as opposed to subjects in the high participation, low structure condition.
- Subjects low in anxiety potential rated the high participation, low structure condition more favorably in terms of teacher affect, teacher skill, and overall, as opposed to subjects in the low participation, low structure condition.

The findings are complex even when considered outside of the context of ATI. For example, the high level of student participation was shown to result in more positive perceptions of teacher skill and higher overall ratings, while high classroom structure yielded higher overall ratings and examination performance. These findings provide an example of a treatment-by-task interaction. That is, different instructional techniques are shown to be differentially optimal, depending on the outcome of interest. This reflects the

criticalness of the fit of instructional techniques to specific instructional outcomes. Some sort of prioritorizing scheme may be necessary where instructional goals include several conflicting outcomes. However, high structure per se was shown to be more effective, overall, in view of the finding that high classroom structure yielded higher overall ratings and higher test performance.

The ATIs involving locus of control are seemingly complex since both externality and internality were employed as separate, discrete dimensions. This is consistent with findings of previous (not reviewed) studies which investigated the dimensionality of locus of control (see Dowaliby and Pagano, 1981 for a review of relevant studies). However, the ATI studies which were reviewed all employed a unidimensional measure of locus of control. In addition, previous ATI studies variously defined structure with one clear instance of a confounding of participation and structural features (Rich and Bush, 1978). Nevertheless, the findings from the present study are consistent with previous findings and expectations. Moreover, the factorial investigation of participation and structure in the present study allows for specific interpretations.

The one ATI uncovered with externality indicated that the approximate upper 36% of the externality distribution in the low participation conditions gave different ratings of teacher skill as a function of structure. Teacher skill ratings were highest for these extreme external subjects in the high structure condition. This result is consistent with the findings of Rich and Bush (1978), Arlin (1975), Parent et al. (1975), and Daniels and Stevens (1976).

The analyses of ATIs with internality clearly indicate the criticalness of participation for extreme internal learners. The high participation conditions yielded higher overall ratings for the upper 60% of the internality distribution. Test scores were also higher for extreme internals as a function of participation. However, this latter finding was demonstrated only for the high structure conditions. This makes sense since those (high structure) conditions provided content-relevant transitions and reviews which would be expected to influence performance on the knowledge test. This difference was significant for the approximate upper 26% of the internality distribution. These findings are also consistent with other cited findings with normally-hearing learners.

The ATIs with manifest anxiety generally revealed that low participation and low structure optimized the ratings for subjects high in anxiety potential. This instructional condition yielded the lowest ratings for subjects low in manifest anxiety. The high participation, low structure conditions, conversely, yielded the highest ratings for low-anxiety subjects. These results are consistent with those of Dowaliby and Schumer (1973) and Peterson (1977, 1979) although those findings were in terms of test performance. Those previous studies differed from the present, however, in that extended instructional periods were employed. It is plausible that outcome differences in the present study are due to this longer period of time and resulting greater amount of instructional material employed.

The consistency of findings from the present study, which employed hearing-impaired learners, with previous findings from studies on normally-hearing subjects, is remarkable. The current effort was based solely on findings

from studies which employed normally-hearing subjects and should provide a model for similar future efforts. The plethora of educational-psychology findings with normally-hearing students is probably directly relevant to investigations of similar phenomena with hearing-impaired learners. More research of this type, drawing from findings based on normally-hearing students, needs to be performed with hearing-impaired learners. It is hoped that the current effort will be viewed as a beginning on which to build. Future efforts should also investigate the generalizability of findings reported here to ongoing instructional situations for extended periods of time.

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Appendix A

o Class Attitude Survey

o Test of Photography Knowledge

CLASS ATTITUDE

SURVEY

NAME: _____

PLEASE CIRCLE THE LETTER THAT BEST DESCRIBES HOW YOU FEEL

How difficult was the class? (Perceived Difficulty)

1.	The class was too hard.	A	B	C	D	E
2.	It was difficult to learn all the information.	A	B	C	D	E
3.	It was usually clear to me what I was supposed to do for class.	A	B	C	D	E

What was the teacher like? (Teacher Affect)

4.	The teacher was an enthusiastic and warm person.	A	B	C	D	E
5.	The teacher was prepared (ready) for class.	A	B	C	D	E
6.	The teacher <u>really wanted</u> to see the whole class improve.	A	B	C	D	E
7.	The teacher was <u>not</u> very interested in the students.	A	B	C	D	E
8.	The teacher was interesting.	A	B	C	D	E
9.	The teacher praised good work.	A	B	C	D	E

Was the teacher clear, organized, and understandable? (Teacher Skill)

10.	The teacher explained things clearly.	A	B	C	D	E
11.	The teacher used many examples.	A	B	C	D	E
12.	The teacher explained new words and new ideas very well.	A	B	C	D	E
13.	The teacher's lecture was well organized and easy to understand.	A	B	C	D	E
14.	The teacher answered questions clearly.	A	B	C	D	E
15.	The teacher created a good feeling in the classroom.	A	B	C	D	E

Overall? (Overall Rating)

16.	This was an excellent class.	A	B	C	D	E
17.	I would tell my friends to take a class from this teacher. The teacher was a good teacher.	A	B	C	D	E
18.	I would tell my friends to take this class.	A	B	C	D	E

Did you actively participate in the class? (Perceived Participation)*

19.	The teacher called on students during the class.	A	B	C	D	E
20.	The teacher used students ideas.	A	B	C	D	E
21.	The teacher asked student to summarize the lesson.	A	B	C	D	E
22.	The teacher said that students would be required to participate in class.	A	B	C	D	E
23.	The teacher welcomed student comments.	A	B	C	D	E

*Item 22 not included; employed for Perceived Structure.

NAME _____

TEST OF PHOTOGRAPHY KNOWLEDGE

1. The view finder is used to aim the camera.

2. F - numbers are numbers which tell the size of the lens opening.

3. The range finder shows a double image or split image for an out-of-focus subject.

4. A movie camera takes at least 18 pictures each second.

5. The camera body is a light-tight box.

6. The XL shutter setting is used for dimly lighted subjects.

7. The shutter and film advance are parts of a movie camera that are different from a still camera.

8. The lens opening controls the amount of light that enters the camera.

9. Simple cameras have small lens openings and do not require focusing.

10. The lens focuses light to form an image.

11. The film advance moves the exposed film out of the way, and replaces it with unexposed film.

12. An electric eye automatically sets the lens opening or shutter speed for you.

13. When you increase the size of the lens opening, you decrease the range of distance that is in focus.

14. It is more important to focus accurately when you increase the size of the lens opening.

15. The lens collects light reflected from the subject.

16. The distance scale is set for the number of feet or meters between the camera and the subject.

17. The shutter controls the length of time the light enters the camera.

19. Light touches the film forming an invisible image called an exposure.

APPENDIX B

Simple Correlations Between Each
Aptitude and Criterion Measure for Each
Instructional Condition

Table B1

Simple Correlations Between Perceived Difficulty Ratings and Each Aptitude in Each Treatment

Treatment	n	Aptitude		
		Manifest Anxiety	Externality	Internality
High Str/High Par	12	-.18	.40	-.29
High Str/Low Par	14	.13	.05	.21
Low Str/Low Par	16	.43	.43	-.62
Low Str/High Par	12	.36	.34	-.54
Low Structure	28	.40*	.38*	-.53**
High Structure	27	.04	.22	-.06
Low Participation	30	.33	.30	-.06
High Participation	25	.08	.36	-.39*

*p< .05, 2-tailed test
**p< .01, 2-tailed test

Table B2

Simple Correlations Between Teacher Affect Ratings and Each Aptitude in Each Treatment

Treatment	n	Aptitude		
		Manifest Anxiety	Externality	Internality
High Str/High Par	13	-.15	-.08	-.62
High Str/Low Par	14	-.13	.38	-.22
Low Str/Low Par	16	.70**	.24	.18
Low Str/High Par	12	-.64*	-.15	.65*
Low Structure	28	.24	.20	.25
High Structure	27	-.05	.23	-.38*
Low Participation	30	.22	.28	-.10
High Participation	25	-.30	-.16	-.21

*p< .05, 2-tailed test
**p< .01, 2-tailed test

Table B3

Simple Correlations Between Teacher Skill Ratings and Each Aptitude in Each Treatment

Treatment	n	Aptitude		
		Manifest Anxiety	Externality	Internality
High Str/High Par	13	-.11	-.10	-.33
High Str/Low Par	14	-.24	.57*	-.41
Low Str/Low Par	16	.60*	-.22	.23
Low Str/High Par	12	-.25	.07	.29
Low Structure	28	.19	.03	.09
High Structure	27	-.04	.33	-.33
Low Participation	30	.11	.07	-.23
High Participation	25	-.17	-.03	-.05

*$p < .05$, 2-tailed test
**$p < .01$, 2-tailed test

Table B4

Simple Correlations Between Overall Ratings and Each Aptitude in Each Treatment

Treatment	n	Aptitude		
		Manifest Anxiety	Externality	Internality
High Str/High Par	13	-.36	.53	.11
High Str/Low Par	14	-.35	.33	.44
Low Str/Low Par	16	.71**	.15	-.21
Low Str/High Par	12	-.55	.27	.37
Low structure	28	.17	.26	-.01
High Structure	27	-.24	.44*	-.14
Low Participation	30	.16	.16	-.40*
High Participation	25	-.42*	.29	.20

*p< .05, 2-tailed test
**p< .01, 2-tailed test

Table B5

Simple Correlations Between the Knowledge Test and Each Aptitude in Each Treatment

Treatment	n	Aptitude		
		Manifest Anxiety	Externality	Internality
High Str/High Par	13	-.08	-.63*	.20
High Str/Low Par	14	-.35	-.29	-.56*
Low Str/Low Par	16	-.22	-.60*	.32
Low Str/High Par	12	-.20	-0.10	-.08
Low Structure	28	-.21	-.28	.01
High Structure	27	-.15	-.39*	-.16
Low Participation	30	-.37*	-.42*	-.40*
High Participation	25	-.07	-.42*	0

*p < .05, 2-tailed test
**p < .01, 2-tailed test

Appendix C

- Frequencies and Percentages of Behaviors by Condition
- Between-Condition Analyses of Variance
- Means and Standard Deviations by Condition

Table C1

Percentage and Frequencies of Behaviors
for Classroom Structure by Student Participation
Instructional Conditions

Behavior	Instructional Condition: High Structure High Participation %	f	High Structure Low participation %	f	Low Structure High Participation %	f	Low Structure Low Participation %	f	Total Across Conditions f
Teacher questions individual student	44	21	0	0	56	27	0	0	48
Teacher questions general w/ response	59	40	0	0	41	28	0	0	68
Teacher questions general comprehension	64	14	4	1	32	7	0	0	22
Student fingerspelling critical words	80	4	0	0	20	1	0	0	5
Student-initiated questions regarding:									
Communication	25	1	0	0	75	3	0	0	4
Conceptual Clarification	54	15	0	0	46	13	0	0	28
Personal Experience	41	7	0	0	59	10	0	0	17
Teacher transitions	50	8	50	8	0	0	0	0	16
Student transitions	0	0	0	0	0	0	0	0	0
Teacher emphasizes important points	57	4	43	3	0	0	0	0	7
Teacher uses mime/ concept. signs	79	59	21	16	0	0	0	0	75
Teacher summarizes content	57	4	43	3	0	0	0	0	7
Student summarizes content	100	22	0	0	0	0	0	0	22
Teacher tells goals/objectives	Yes		Yes		No		No		-
Teacher tells expected behaviors	Yes		Yes		No		No		-
Test items covered by instruc. content	Yes		Yes		Yes		Yes		-

Table C2

Summary of Participation-by-Structure Analyses of Variance On All Variables

	Instructional Variable					
	Participation (P)		Structure (S)		P x S	
Dependent Variable	df	F	df	F	df	F
Background Variables						
Year in College	1,49	.8	1,49	.3	1,49	.9
Reading Ability	1,49	.23	1,49	.38	2.07	1,49
Simultaneous Communication	1,49	7.83	1,49	.73	1,49	.49
Aptitude Measures						
Manifest Anxiety	1,49	.8	1,49	.3	1,49	.9
Externality	1,49	.7	1,49	2.0	1,49	.1
Internality	1,49	1.1	1,49	1.6	1,49	1.1
Student Ratings						
Perceived Difficulty	1,46	.3	1,46	1.0	1,46	.2
Teacher Affect	1,46	2.3	1,46	1.3	1,46	.001
Teacher Skill	1,46	9.6**	1,46	1.7	1,46	1.7
Overall rating	1,51	5.6*	1,51	4.5*	1,51	.4
Perceived Participation	1,51	40.5**	1,51	1.3	1,51	.4
Perceived Structure	1,51	2.7	1,51	10.6**	1,51	.1
Test Score	1,51	2.2	1,51	16.2**	1,51	.03
Test Time	1,51	.1	1,51	32.8**	1,51	15.51**
Instruction Time	1,54	**	1,54	**	1,54	561.08**

*p< .05
**p< .01

Table C3

Means, Standard Deviations and n's for the Participation by Structure Conditions

	Instructional Condition											
	High Structure						Low Structure					
	High Participation			Low Participation			High Participation			Low Participation		
Variable	Means	SD	n	Means	SD	n	Means	SD	n	Means	SD	n
Background Variables												
Year in College	1.78	.89	14	2.43	1.50	14	2.28	.99	14	2.19	1.47	16
Reading Ability	9.74	1.32	12	9.84	1.32	12	10.23	.91	13	9.44	1.25	16
Simultaneous Communication	84.33	12.26	12	72.54	16.59	11	83.67	15.67	12	76.75	11.59	16
Aptitude Measures												
Manifest Anxiety	18.17	4.06	12	12.43	6.69	14	16.31	6.37	13	16.64	5.97	14
Externality	2.58	.43	13	2.46	.48	14	2.83	.50	14	2.58	.63	16
Internality	3.57	.70	13	3.57	.54	14	3.63	.66	114	3.94	.35	16
Student Ratings												
Perceived Difficulty	2.95	.54	13	2.76	.56	14	3.00	.53	12	3.02	.61	16
Teacher Affect	3.76	.47	13	3.48	.66	14	3.60	.31	12	3.34	.54	16
Teacher Skill	4.15	.56	13	3.68	.71	14	4.08	.60	12	3.31	.67	16
Overall Rating	3.82	.59	13	3.50	.61	14	3.56	.67	12	3.00	.80	16
Perceived Participation	4.06	.43	13	2.88	.82	14	3.92	.40	12	2.58	.98	16
Perceived Structure	3.69	1.11	13	3.14	1.17	14	2.67	.78	12	2.25	1.18	16
Test Score	25.00	10.02	13	20.50	11.48	14	13.50	11.35	12	9.94	7.70	16
Test Time	7.52	1.30	13	9.51	2.80	14	6.73	2.32	12	4.35	1.47	16
Instruction Time	50.00	.00	14	33.90	.00	14	43.55	.00	14	27.00	.00	16

Appendix D

o Figures of Significant

Aptitude-by-Treatment Interactions

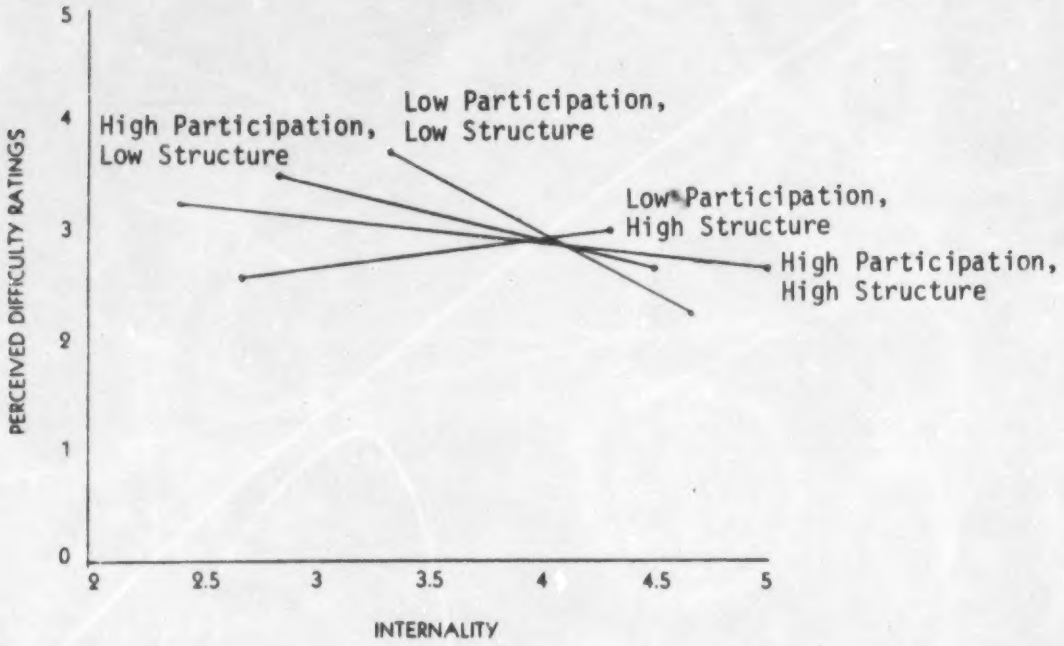

Figure D1. Regression of perceived difficulty ratings on to internality for each instructional condition.

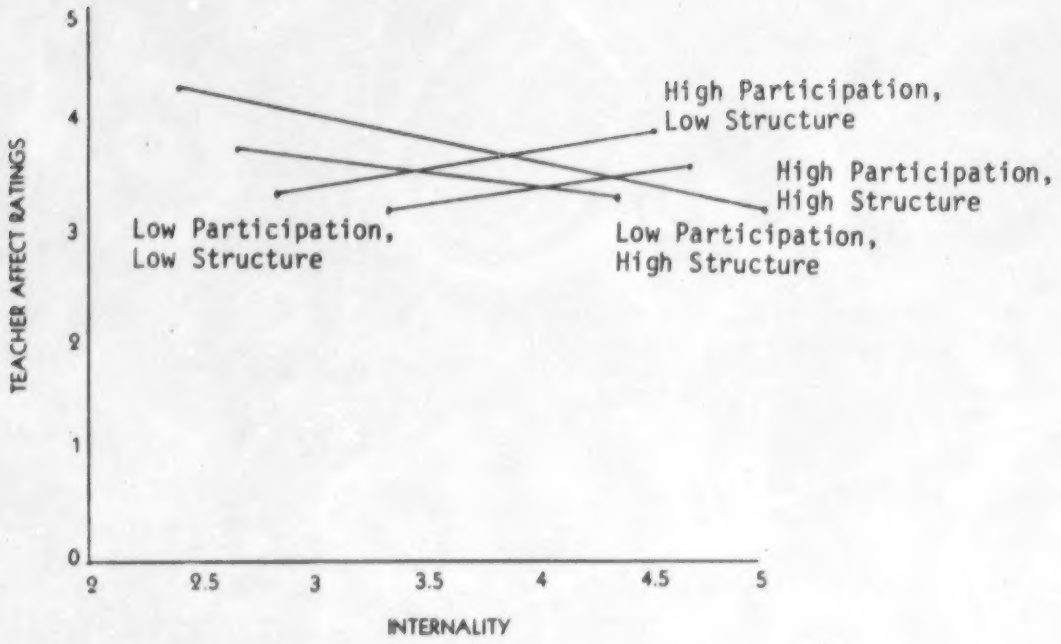

Figure D2. Regression of teacher affect ratings on to internality for each instructional condition.

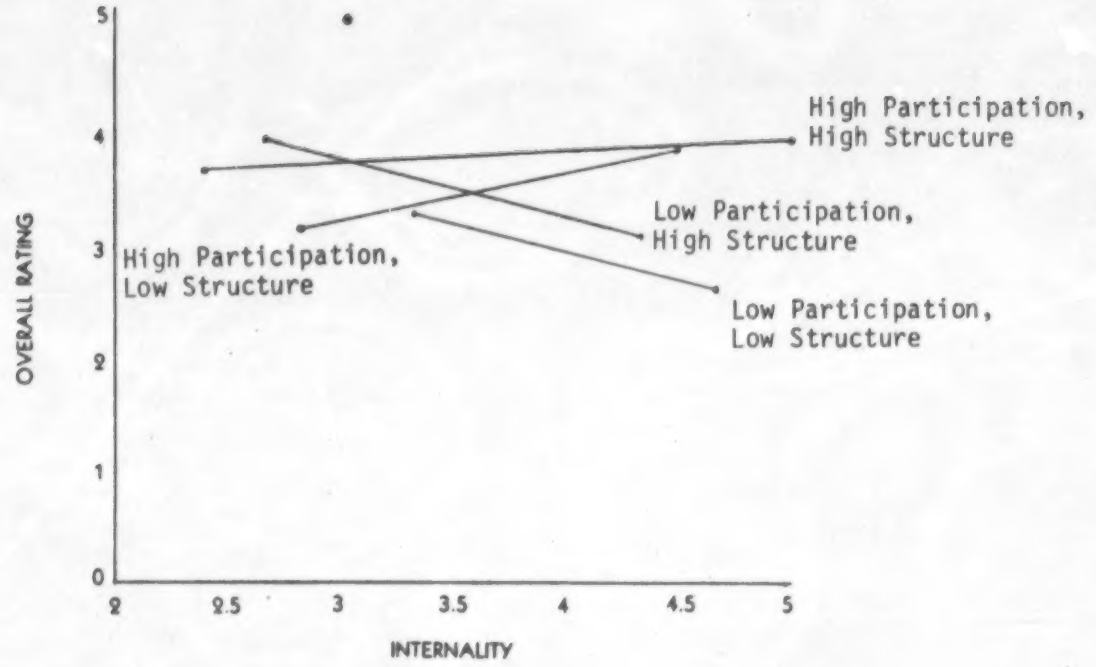

Figure D3. Regression of overall ratings on to internality for each instructional condition.

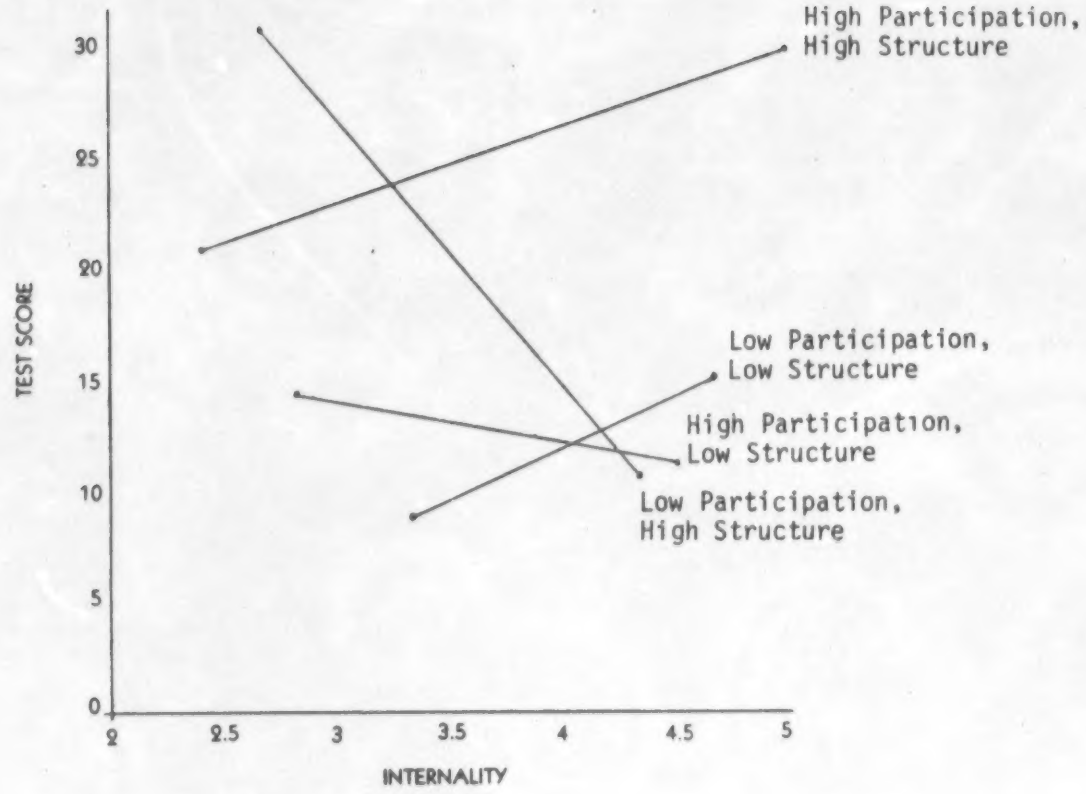

Figure D4. Regression of test score on to internality for each instructional condition.

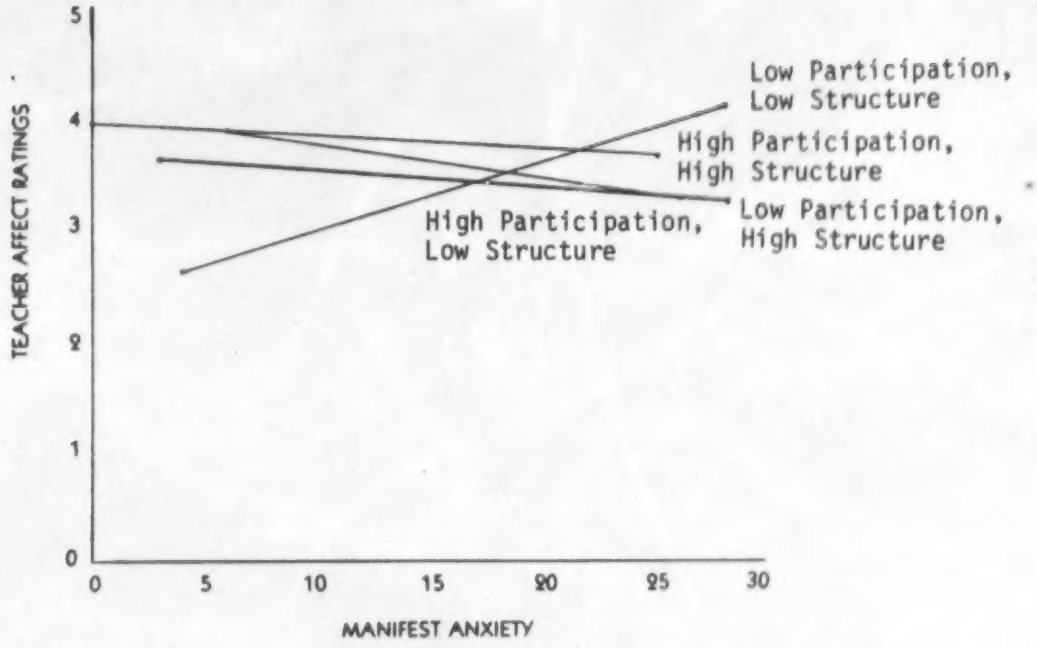

Figure D5. Regression of teacher affect ratings on to manifest anxiety for each instructional condition.

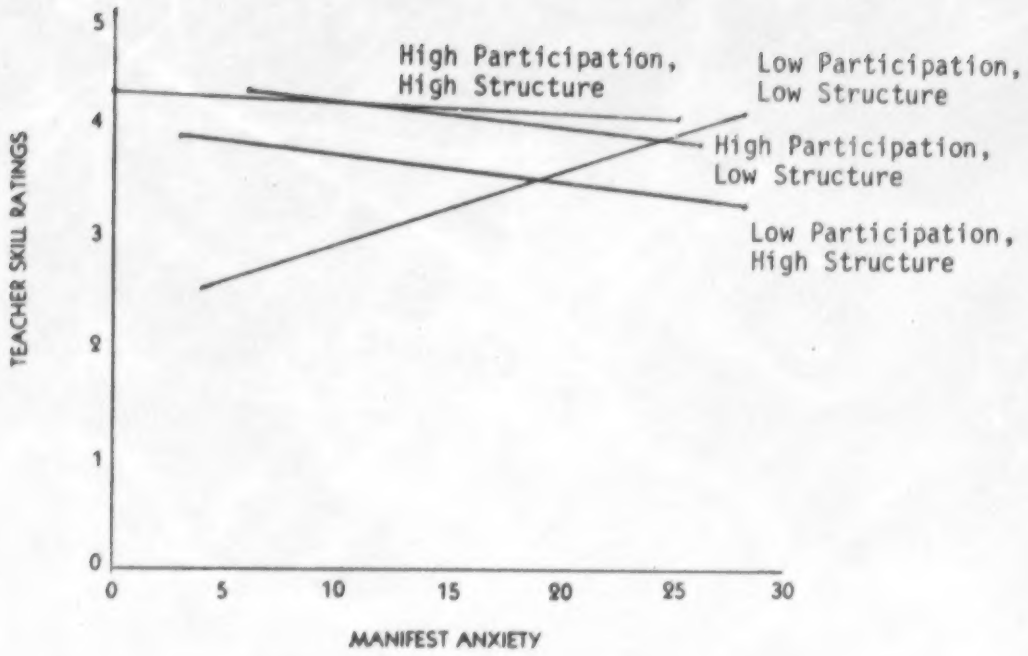

Figure D6. Regression of teacher skill ratings on to manifest anxiety for each instructional condition.

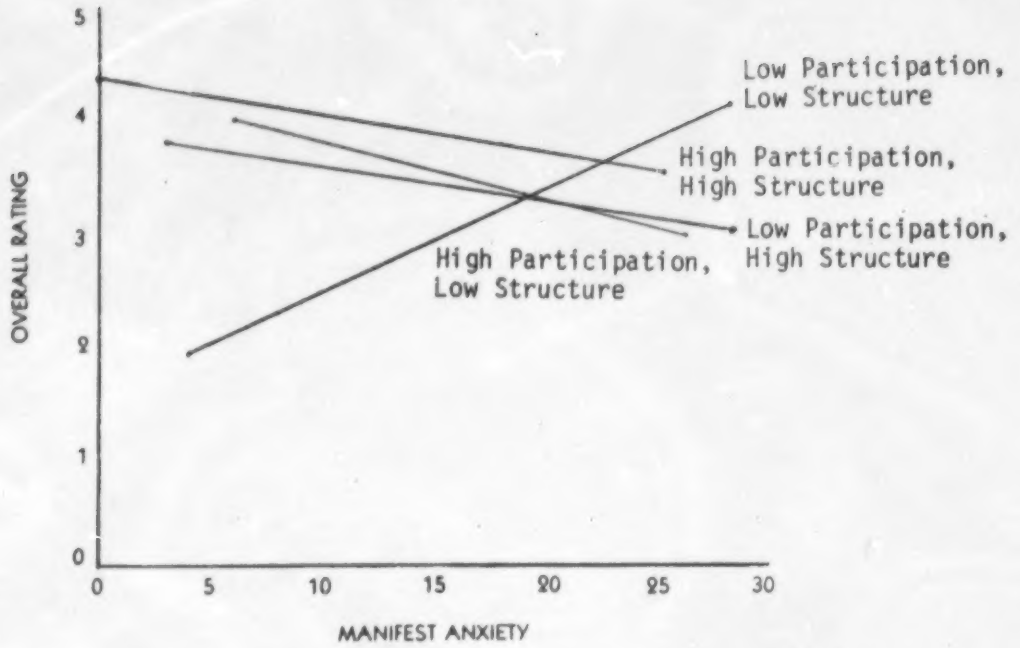

Figure D7. Regression of overall ratings on to manifest anxiety for each instructional condition.